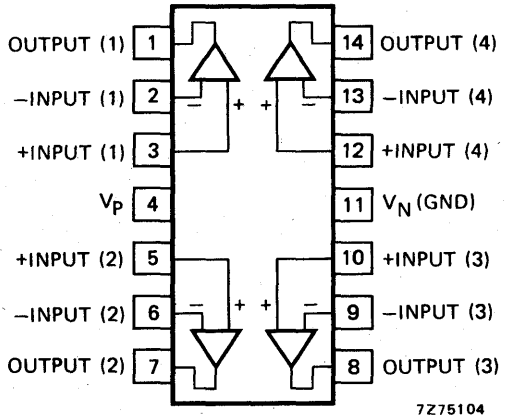
QUADRUPLE OPERATIONAL AMPLIFIER

The TDA0324D consists of four independent, high gain, internally frequency compensated operational amplifiers. It is especially designed to operate from a single power supply over a wide range of voltages.
The circuit is equivalent to the LM324, however it is mounted in a miniature plastic package.
The device can be directly operated from the standard +5 V supply voltage which is used in digital systems and will easily provide the required interface electronics without requiring the additional ±15 V supplies.

Features

- Internally frequency compensated for unity gain
- Large d.c. voltage gain: 100 dB
- Unity gain bandwidth: 1 MHz
- Wide supply voltage range: 3 to 30 V
- Low supply current drain: 1 mW per op amp at $V_P - V_N = 5$ V
- Differential input voltage range equal to supply voltage
- Input common mode range includes ground
- Large output voltage range: 0 to $V_P - 1,5$ V
- Operating temperature: −25 to +85 °C

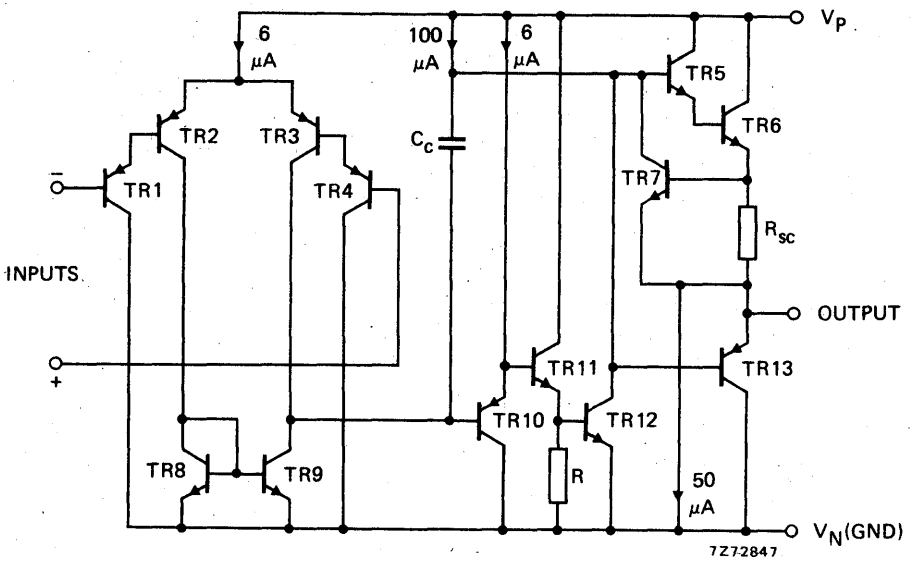
CONNECTION DIAGRAM



PACKAGE OUTLINE (see general section)

SO-14; plastic 14-lead flat pack.

CIRCUIT DIAGRAM (one amplifier)



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage	$V_P - V_N$	max.	32	V
Differential input voltage	$V_{I+} - V_{I-}$	max.	±32	V
Common mode input voltage	V_{I+}; V_{I-}	max.	−0,3 to +32	V
Output short-circuit to V_N (see note)	continuous at T_{amb} = 25 °C; V_P < 15 V, only one amplifier			
Temperatures				
Operating ambient temperature	T_{amb}		−25 to +85	°C
Storage temperature	T_{stg}		−65 to +125	°C
Junction temperature	T_j	max.	125	°C
Power dissipation in free air; T_{amb} = 50 °C (see note)				
Mounted on a ceramic substrate of 4 cm²	P_{tot}	max.	500	mW
derating factor for T_{amb} > 50 °C	$1/R_{th}$	=	6,7	mW/°C
Mounted on PC board of 4 cm²	P_{tot}	max.	360	mW
derating factor for T_{amb} > 50 °C	$1/R_{th}$	=	4,8	mW/°C

Note: Short-circuits from the output to V_P can cause excessive heating and eventual destruction. I_o max. is about 40 mA independent of the magnitude of V_P. At values of V_P in excess of +15 V, continuous short-circuits can exceed the power dissipation ratings and cause eventual destruction.

CHARACTERISTICS at $V_P = +5$ V; $V_N = 0$; $T_{amb} = 25$ °C unless otherwise specified

Parameter	Conditions	Symbol	min.	typ.	max.	Unit
Input offset voltage		V_{io}	–	2	7	mV
Input offset current		I_{io}	–	5	50	nA
Input bias current	1)	I_i	–	45	500	nA
Common mode input voltage	$V_P \leq 30$ V 2)	V_i	0	–	V_P-1,5	V
Common mode rejection ratio	d.c.	CMRR	–	85	–	dB
Power supply rejection ratio	d.c.	PSRR	–	100	–	dB
Amplifier to amplifier coupling	f = 1 kHz to 20 kHz (input referred)		–	-120	–	dB
Large signal voltage gain	$R_L > 2$ kΩ	G_v	–	100	–	V/mV
Output voltage range	$R_L > 2$ kΩ	V_o	0	–	V_P-1,5	V
Output current source	$V_{I+} = 1$ V; $V_{I-} = 0$ V	I_o	20	40	–	mA
Output current sink	$V_{I+} = 0$ V; $V_{I-} = 1$ V	I_o	10	20	–	mA
Supply current	$R_L = \infty$ (all op amps)	I_P	–	0,8	2	mA

1) The direction of the input current is out of the IC due to the p-n-p input stage.

2) Either input signal voltage should not be allowed to go negative by more than 0,3 V. The upper end of the common mode voltage range is V_P -1,5 V, but either or both inputs can go to +30 V without damage.